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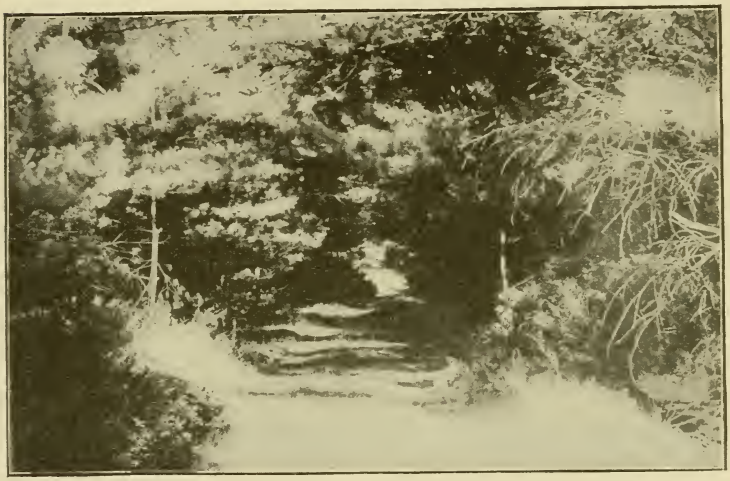
NEW HAMPSHIRE COLLEGE
AGRICULTURAL EXPERIMENT STATION

FORESTRY

I. How to Make a Beginning.
II. Waste Lands: How to Convert Them into Forests.



"*To arched walks of twilight groves,*
And shadows brown, that Sylvan loves."—Milton.

BY F. WM. RANE

NEW HAMPSHIRE COLLEGE
OF
AGRICULTURE AND THE MECHANIC ARTS
DURHAM

NEW HAMPSHIRE COLLEGE

OF

AGRICULTURE AND THE MECHANIC ARTS

AGRICULTURAL EXPERIMENT STATION

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FORESTRY

F. WM. RANE

"There is something nobly simple and pure in a taste for the cultivation of forest trees. It argues, I think, a sweet and generous nature to have this strong relish for the beauties of vegetation, and this friendship for the hardy and glorious sons of the forest. There is a grandeur of thought connected with this part of rural economy. It is, if I may be allowed the figure, the heroic line of husbandry. It is worthy of liberal, and free born, and aspiring men. He who plants an oak, looks forward to future ages and plants for posterity. Nothing can be less selfish than this."

WASHINGTON IRVING.

I. HOW TO MAKE A BEGINNING IN FORESTRY

The time for action in forestry has arrived. In New England fully 50 per cent. or more of our land is not tilled. Much of this is waste land. The problem before us is what are we to do with this land. Modern ingenuity, we believe, can and will mark out our course of procedure. Men like the late Hon. John D. Lyman and others have done their utmost to awaken us to activity, and their pioneer work was not in vain.

Let us go over our farms at once and determine what land we want to farm, that is, the land that is to be considered in a rotation, plowed, and handled under modern methods of agriculture (none other pays). When the tillable land is selected, then turn the remainder over to forestry. One can make these lands serve him in no better way. The fence problem now comes up. Whether to fence off the tillable or forest land or both, will depend upon one's conditions. Each must settle this for himself.

We now have our farming divided definitely into two main crops, the tillable or field and the forest crops.

THE FOREST CROP

It is the forest crop we are to consider in this bulletin. In the first place, if domestic animals are kept out and nature

FIG. 2.—Waste land, An abandoned field. Nature's method of reclaiming. By transplanting seedlings in the open space man can assist nature in quickly growing a forest crop here.

allowed to take her way, in the course of time she will reclaim the forest as her own. The accompanying photographs show her gradual reclaiming processes. A drive or stroll through almost any section of New England will give one plenty of these object lessons. No wonder that New England has a charm for every one; we find here a climate, soil, and general environment for plant growth that with all of our depleting methods of agriculture we cannot destroy. Were we to leave this country for a century or so to itself, nature would reclothe herself from the mountains and Canadian line to the sea in one vast forest.

HOW TO ASSIST NATURE

While we realize nature's methods are good and under some circumstances are all that are needed, in others man can come to her assistance and secure results in a comparatively short time.

Just how we can render this assistance will depend upon many conditions. Under this head comes the entire question of forest culture and management. Few people become good farmers until they have solved the questions of what crops are best adapted to the soils they are working, and which crops bring the best results for feeding. We grow corn for silage or the grain; potatoes, apples, etc., for the market. In short, we plant and select our crops with a definite aim constantly in view. Forestry farming needs husbanding and forethought in just the same way. The time is now ripe for it. The Experiment Station has already published a bulletin, No. 95, "How to Grow a Forest from Seed," which is free for distribution to every one. It was written with the idea of helping to make a beginning in forestry.

Getting forest growth started means the bringing back of these unproductive and non-agricultural lands into a productive condition. There has been much agitation in the state legislature regarding this matter but legislation lags because common sentiment is not sufficiently aroused. We all desire that our towns and counties should increase in value that we may have better schools, churches, roads, etc.; in order to do this valuations must exist from which taxes are derived. If our local

FIG. 3 Waste land. A natural pasture (so called). The ledge outcrops in many places and stones are abundant. Once a luxuriant forest, now valueless. Adapted to no other use than forestry.

men and public officials will study out and advocate simple practical solutions of forestry management as adapted to their conditions, these desired results will rapidly ensue. If each town would send a strong representative to the Agricultural College for simply the winter term of ten weeks to study forestry with the idea of his returning to advocate the principles there learned as best adapted to local conditions, it would be a worthy and legitimate expenditure. How quickly we realize the advantages secured by advocating modern methods in dairying; forestry is bound to yield even greater returns to us. The little towns and hamlets throughout New England that in former times flourished because of their forest products and to-day are almost abandoned, will spring into activity. Farming will again be made possible, as the forests will give continued income throughout the winter season.

II. WASTE LANDS. HOW TO CONVERT THEM INTO FORESTS.

Our waste lands are for convenience divided into the following kinds:

Waste lands having possible forest values.

1. Run out agricultural fields and abandoned farms.
2. Natural pastures (so called). Usually stony or hilly and unadapted for cultivation; junipers, hard-hack, sweet fern, and brush kept down by the treading of animals and by cutting and burning occasionally.
3. Burned over wood lots and forests.
4. Sprout or brush lands.
5. Depleted sandy lands (barrens).
6. Low or wet lands.

1. Run-out Agricultural Fields or Abandoned Farms

When lands that have been used for agriculture have become so depleted that the income from pasturage is not worth over one dollar an acre per year, more can be derived from them

FIG. 4.—Two conditions are illustrated here. *First*, the possibilities of forest growth on land unadapted for agriculture. *Second*, the effect of cutting away the forest mantle and allowing the wind to get a leverage under and topple the trees over. A wind fall.

as an investment if they are converted into forests or wooded tracts. There are many ways of assisting nature in getting growth established here. It may be advisable sometimes to plow the land if it can be easily done. Seeds start better or seedlings are more easily set into plowed land. Where it will answer the same results may be accomplished by plowing strips or furrows a few feet apart. The objection to plowing or working the land is on account of the expense incurred, as this of necessity must be low. Pasture or sod lands are more or less stubborn to the growth of tree seeds. Seeds sown broadcast in sod land seldom germinate sufficiently to give a good stand of trees. Most seeds germinate, however, if given proper conditions. (See Bulletin No. 95 of the New Hampshire Experiment Station.)

The best way probably is to transplant young seedlings wherever growth will not come in naturally. This is particularly true of the white pine and spruce. For deciduous or broad-leafed trees, the seedling maples, elm, catalpa, locust, birch, oak, ash, basswood, nuts, etc., can be similarly handled, but if the ground is in suitable condition for receiving the seeds direct by either plowing, digging a hole with a grub-hoe or mattock, etc., the seed may be planted direct. The deciduous or hardwood trees even if started in a nursery need transplanting into permanent quarters after one year's growth, as their growth is so much more rapid in the earlier stages of life. The white pine should remain in the nursery at least two years and the spruce and balsam three before transplanting. Where hard shelled seeds, as nuts, are to be planted directly where they are to grow, *stratification*[1] of the seeds is recommended to ensure germination and protection from enemies and heaving out over winter.

If the land we desire to convert into tree growth borders on a wood lot or has old trees about its boundary or within it, it is desirable that these be allowed to remain. All kinds of tree or brush growth assist in shading the land, thus retaining moisture and protecting the growth of seedlings. Trees like the pine, scrub or otherwise, yield frequent crops of seed that are scattered broadcast and finally result in tree growth.

[1]See N. H. Experiment Station Bulletin, No. 95.

FIG. 5.—Scrub pines like this if allowed to remain yield quantities of seeds and restock abandoned fields. One side of this fence is kept clean for a pasture; the other is neglected and quickly coming into tree growth. Which is the more profitable?

Figure 2 represents a cultivated field which could be greatly assisted by transplanting into the open spaces wherever young seedlings are not already established. It so happens that the field here represented is largely stocked with natural pine seeding that has blown in from pine growth found on the right and but little shown in the photograph. From this discussion it is seen that there are various ways of handling this subject, but as conditions differ in every case each person must use his best judgment in solving the problem. When fields are more or less isolated it may take many years to get a very indifferent start by nature's methods, while all this time will be saved if we establish the crop at once.

2. Natural Pastures.

Under this head is classified those lands or fields that were of a luxuriant forest growth originally but too rocky and stony or hilly for agriculture, and, therefore, when the timber was cut off, were used for pasturing animals. Lands that dry out easily and that are deprived of the vegetation which is so closely cropped by usually too many animals for the area, tell the story. One of these natural pastures is shown in figure 3. This field is perhaps somewhat advanced in vegetation, as the surface growth is well established. The ledge outcrops in many places and stones are abundant. There are many fields of this kind in New England. To return them to forest conditions is no small task. Wherever soil is found or there are patches here and there, the same principles will apply as indicated under the preceding heading. This will assist in getting a foothold or basis of operation. When these fields have advanced to the stage shown in the photograph the hardest task has been accomplished, and that is to get vegetation enough to hold moisture. Most of this land is well adapted to white pine growth when once established. Cedars also do well here. The New Hampshire College forest, in which we take so much pride, is growing on just such land as this. Such land is adapted for no other uses than forestry. Wherever forests now stand under these conditions precautions should be taken to see that a second crop is coming on before all of the present one is harvested.

FIG. 6.—The crop has been harvested. Now is the time to take precaution against fire. Retain the forestal covering and get new growth established as soon as possible.

3. Burned-over Wood Lots and Forests.

It seems to be instinctive for people to follow the custom of burning over the wood lot or clearing as soon as the cord wood is removed. No greater mistake can be made if the land is again desired for tree growth. When the fire runs over such land it destroys the accumulation of leaf mould or humus which is invaluable for retaining moisture and protecting seeds and seedlings. Fire leaves the land in a destitute condition. When kept out even in rocky and extremely poor soils, deciduous or hardwood trees will begin to copse or spring up from the old stumps, especially from the younger growth; seeds germinate and vegetation rapidly regains possession. Of course if the land is to be cleared for cultivation that is another matter. These burned-over wooded tracts are usually the most stubborn kinds to again reclaim. If the soil is fairly good it is a much easier matter than if ledgy and stony or light and sandy. The remedy is to never allow fire to run over such lands, and where they already exist to plan to bring them into forests as recommended in the two previous headings. A few trees for seed and shade should be left scattered over the cutting when it is made, if nature is to assist, but if it is reset with seedlings at once this is not needed.

4. Sprout or Brush Lands.

Much of this land is found throughout New England. Its value depends largely upon the nature of the soil. Where the soil is good such lands soon grow into a forest of a more or less indifferent growth. There is usually a mixture of varieties and they will vary much in their value at maturity.

The value of such lands from a forestry standpoint is deduced largely from the nature and kind of growth predominating. Where oaks, hickories (walnuts), maples, etc., are growing, the soil is good; but where the growth is largely gray birch, poplar, etc., it is usually light and poor. Where the latter contains a good seeding in of white pine, however, it may be valuable.

Just how to do something with these lands is a problem for us to settle independently in each case. There are various

things that can be done. (a) If the land is good and well stocked, as soon as the growth is large enough so that pole wood can be taken out, in which case it will pay for the expense, begin by making improvement cuttings or thinnings. Cut out the undesirable wood and leave the other. A forest

FIG. 7.—Even the rocky and stony lands if covered with forest growth lose comparatively little of their soil by washing. Root growth retains soils, and the rich decaying organic matter or forestal covering is invaluable for successful tree growth. (College woods.)

handled in this way will grow in value rapidly. The ultimate product will also be limited to a few of the more desirable kinds. (b) Another way of handling these lands is to clear strips of varying widths according to the nature of the growth through the tract and in them either sow seeds or transplant seedlings. When these have become sufficiently established

the remainder may be removed and handled as the first. When the growth removed does not pay for the expense of cutting, however, the practice becomes a questionable one. The expense question should be constantly kept in mind. It must be taken into consideration that the first expense of establishing growth is the principal from which interest must continually accrue and that profits are those returns over and above this. The smaller the first cost the greater the chances for financial success.

In many sections of New England brick yards are great consumers of cord wood, and if the hardwoods are cut as soon as large enough for this purpose the old stumps will sprout again, giving what is known as coppice wood. This is a profitable and quick method of growing this kind of wood. Along the sea-coast, where this growth reaches a good size, the poles are used for holding fishing nets, and bring a good price. Small coppice wood is also often valuable for cooperage, etc. Coppice wood is usually cut at ages varying from fifteen to thirty years and is, therefore, not so much depended upon for lumber. Lumber can be grown from coppice by thinning but the usual practice here is to sow seed or transplant seedlings. Telegraph poles and railroad ties can also be grown from coppice, if the growth is allowed to stand a period of thirty-five or forty years. Well-established coppice averages about one cord of wood per acre per year of growth. A coppice wood that is twenty-five to thirty-five years of age should yield about that many cords.

Pine, spruce, and conifers in general do not reproduce themselves by coppice. These start from seed.

5. Depleted Sandy Barrens.

There is much land in various sections of the state that is largely worthless to-day which originally was covered with a valuable forest growth. These sandy soils should never have been allowed to be cleared and thus deprived of their forestal covering which was invaluable to them in retaining moisture and plant food so necessary for tree life. The only thing to be done to these depleted lands is by some means to get new growth started so that former conditions can be returned.

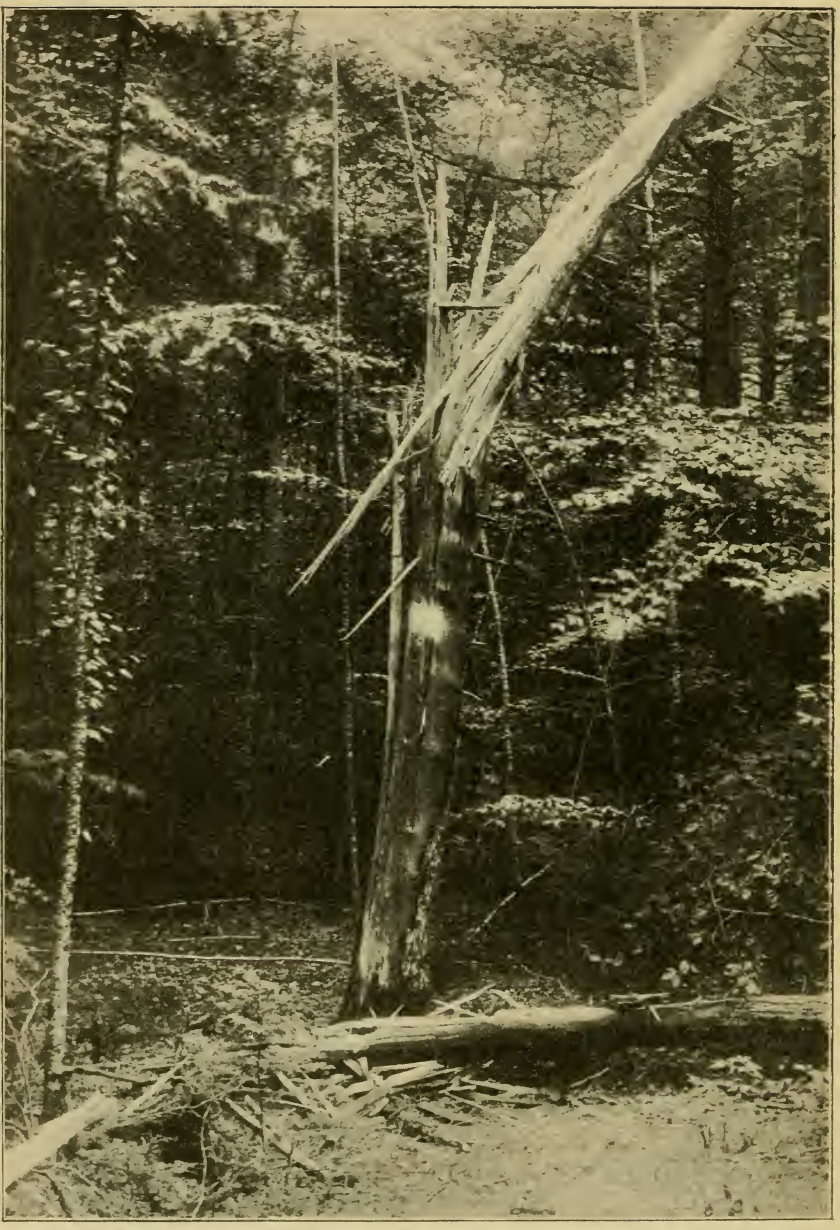

FIG. 8.—Valuable forest growth on comparatively low and wet land not adapted for agriculture. A tree struck by lightning. (College forest.)

Gray birch will grow here many times when nothing else will. If sweet fern, hardhack, or some of the weeds should pave the way by covering the ground, hence shading it, thus offering opportunities for seed germination and protection, other tree growth will get established. One of the first growths to get established is gray birch. This tree grows rapidly and in a short time, if conditions are favorable for seeding in, the pines follow. The birch is short lived and it is not uncommon to see here a clear stand of pine in the course of a few years. We can assist matters very much by cutting out the birch wood as soon as it is large enough for firewood, when the land will be given over entirely to the pine growth. Birch wood is considered very desirable for firewood, and is commonly used for that purpose throughout New England. The pines are especially adapted for growing in sandy soils, as they take such a small part of their subsistence from the ground. The greater bulk of the elements going to make up pine wood comes from the air. Even when young pine seedlings are set out in sandy lands the danger comes largely from their drying up during midsummer before their roots have gone deeply enough into the soil. When once established they will look out for themselves. Retain all the growth of any kind found present upon these lands, and from these as a nucleus, gradually bring the area under control. Always retain sufficient growth to protect the forest floor, or covering of leaves and decaying organic matter, when harvesting a crop. When sufficient young growth has been established under these, then they are removed. At first even all scrub pine trees of any kind or description should be allowed to remain. These often are profuse bearers of cones and thereby assist very much in stocking down the land to new growth. Where the land is not surrounded by pines the work of sowing seed artificially is necessary. The study and practice of reconverting waste sandy lands into forests has received much attention in the older countries.

6. Low or Wet Lands.

Lands that are low but that drain off sufficiently during the growing season often make natural forest lands. Seeds germ-

inate here readily and even clean cuttings quickly restock themselves naturally. Soils that are continuously wet and upon which the water stagnates usually are of little value for forestry unless drained. Where water has been dammed up and caused to stand about trees for some time they die. Some trees seem to stand more moisture than others. The American larch or tamerack frequents moist low grounds. The willow, sycamore, ash, elm, swamp maple, and even white pine are found here more or less. The spruces, firs, and cedars do well

FIG. 9.—Low and wet lands bordering bodies of water, and those not easily drained often give valuable tree growth. Forest growth about a mill pond. Seeds germinate quickly in moist soils.

on moist or wet lands. Wherever there is plenty of moisture seeds readily germinate. Many do equally well on high ground. Low or wet lands are usually very rich in plant food, the accumulation of deposits from the higher ground. When this soil is drained or raised it contains valuable elements that become very available as plant food, and trees grow rapidly in it.

The ideal place for growing the willow for making baskets, furniture, etc., is in these rich bottom lands. When the sprouts are of the required size they are harvested and others grow to take their places.

Overflow streams and brooklets are often kept within their banks and not allowed to gulley out and carry away so much of valuable soil containing plant food, where tree growth bounds their course. By keeping these soils in forest growth something is derived from them that otherwise would be wasted. Just how to assist, improve, and keep them in forestry can be solved if we carefully study out the conditions and act accordingly.

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